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The *I.C.I. Magazine* is published for the interest of all who work in I.C.I., and its contents are contributed largely by people in I.C.I. It is edited by Sir Richard Keane, Bt., and printed at The Kynoch Press, Birmingham, and is published every month by Imperial Chemical Industries Limited, Imperial Chemical House, Millbank, London, S.W.1. Phone: VICtoria 4444. The editor is glad to consider articles for publication, and payment will be made for those accepted.

CONTENTS

FRONT COVER: *"Wayside Fire," by E. B. James (Plant Protection Ltd.)*

P. C. Allen *is Fibres Group Director of I.C.I. An enthusiast for foreign travel, he has more than once made use of the opportunities offered by his job to write for the* Magazine.

Hugh Dunt *is Shipping Manager at Mombasa in Kenya to the Magadi Soda Co. Ltd. He joined this company at the end of* 1951 *after* 17 *years with I.C.I. "I write for fun," he tells us, "but collect more rejections than acceptances.* Blackwood's Magazine *printed a story of mine last June."*

Sir Alexander Fleck *has been Chairman of I.C.I. since July* 1953. *The steps in his career are as follows. Started as a lab boy at Glasgow University. Gained chemistry degree there at age of* 22. *Appointed to university teaching staff* 1911. *Joined Castner-Kellner Alkali Co. as chemist* 1917. *Works Manager of Wallsend Works* 1919, *Managing Director, General Chemicals Division,* 1931. *Chairman, Billingham Division,* 1937. *I.C.I. Director responsible for Billingham and Wilton* 1944. *Deputy Chairman* 1951.

Ernest Hainsworth *is Senior Mycologist of Plant Protection Ltd. During the war he became Indian Army Mycologist after serving as a captain in the Royal Artillery. Later he was Plant Pathologist to the Indian Tea Association.*

Science and Business

A Balanced Partnership

By Sir Alexander Fleck

The editor makes no apology for printing almost in full Sir Alexander's presidential address in Glasgow last month to the British Association for the Advancement of Science. Drawing on his great experience, Sir Alexander outlined the sort of relationship which he believes ought to develop between science and business in the Second Industrial Revolution which we are now entering.

In a population which depends so much on science (said Sir Alexander in the course of his presidential address) it is sad to think how few people clearly understand what it is all about. It is an approach to an understanding of the universe along a broad highway of organised knowledge firmly founded on observation and experiment embedded in a matrix of theory.

It is a highway which is constantly being widened and extended and repaired. We are building it because we think that by and large it is a good road for mankind to travel, and that it is leading him away from ignorance and wretchedness towards a fuller life and a better world. Some find that the act of extending the highway gives them all they seek from their life work: these are the pure scientists, and much of our progress derives from them. Others find greater satisfaction in utilising what has already been built, pausing perhaps to strengthen it here, widen it there: these are the technologists or applied scientists. A few people combine both functions, driving the road forward into undiscovered territory, then paving it ready for all to use.

Whatever our own work may be, we have a joint responsibility to see that the highway is properly and extensively used by all mankind. It is therefore fitting that the British Association is now devoting itself to the additional task of securing the greater use of this highway by all types of people in these islands, more especially as we enter what is often called the Second Industrial Revolution.

In the First Industrial Revolution man learned to convert chemical energy, derived from the reaction between carbon and oxygen, not merely into heat but into mechanical energy, steam being the key to the process. In the Second Industrial Revolution we are turning from the external properties of carbon atoms to the internal properties of the lightest and heaviest atoms in nature as a source of energy to expend as prodigally as we like, thus husbanding carbon atoms as a source of materials.

Another feature of the Second Industrial Revolution is the growing interdependence of the sciences as they advance on a broad front. To review the achievements of the last year or two alone, the launching of the Russian and American earth satellites depended on prior developments in several different sciences and technologies. Chemical rocket fuels, refractory combustion chambers, and radio transmitters which despatched back to the earth information of great relevance to the theme of the International Geophysical Year—all played their part. Miniature transmitters themselves followed the invention in the Bell Telephone Laboratories ten years ago of the transistor, which in turn owes its successful development, at least in part, to the perfection of methods for separating traces of boron and other elements from silicon to a degree of purity exceeding one part in a thousand million.

All of us here recognise the creative possibilities of thermonuclear fusion energy opened up by the Harwell and Aldermaston experiments on high-temperature electric discharges. Although most of the neutrons so far produced have not originated from thermonuclear fusion, there can be no doubt that ZETA and SCEPTRE are symbols of man's reach into a future of boundless energy; his grasp of such a prize could well rank as his greatest material achievement in the history of the world. In such experiments as these, as indeed with the discovery of nobelium, a prerequisite of success is a flourishing electrical industry which can provide many of the tools of nuclear physicists.

Expensive Research

Scientific effort on this scale costs money; indeed, the total annual research expenditure in this country alone is estimated to be £300 million. Such effort also costs scientists. Public expenditure on education (including the universities) is now some £740 million a year; if our universities are to grow large enough to accommodate everyone who could benefit by such an education, instead of merely the 3½% of the population who enjoy it now, we shall need to contemplate spending something nearer £1200 million a year. These are large sums, and if as a nation we are to stay solvent they can only come from one source—the wealth which we produce.

A Partnership with Business

In this context it is easy to see the importance and responsibility of business, which produces and distributes most of our national wealth. Our capacity to extend our science and education largely depends on our ability to run business successfully. Lewis Mumford in his *Technics and Civilisation*, written in the 1930s, though appearing to exaggerate their numerical importance, suggests that it may have been no accident that there were merchants of the City of London who played a part in the early days of the Royal Society. He draws attention to the affinity of science and business when he writes: "The power that was science and the power that was money were, in final analysis, the same kind of power: the power of abstraction, measurement, quantification."

On an occasion such as this it is difficult to avoid being at once too general and too particular. I have chosen to speak of business because business is a more comprehensive term than industry. At the same time I intend to limit my scope primarily to the larger units, although naturally I recognise the importance of the smaller organisations—indeed, in manufacturing industry alone, three-quarters of all establishments employ fewer than 100 people.

Defining the limits of my subject in this somewhat arbitrary way will for the moment do service for a formal definition of the term "business." After all, it is a vague word; perhaps, for euphemistic reasons in the past, even deliberately vague. Nevertheless I venture to put forward three characteristics which I think a business should have if it is to survive and function effectively over a period of years.

Three Guiding Principles

(*a*) *First, it must contribute to the well-being of the community and its social evolution. I believe it can best do that in three specific ways: by producing goods or services for the community at fair prices; by giving fair treatment in the way of remuneration and working conditions to all who give their services to the business, whether as payroll employees, administrators or scientific staff; and by giving a fair return to those who risk their money in the business, so that, apart from this consideration, they will be encouraged to provide again for further ventures. When business takes on itself the deployment of financial, material and human resources, it also takes on, I believe, the responsibility for seeing that they are properly and effectively used. In other words, it has an obligation to the community; and only in so far as it fulfils that obligation does it contribute to the well-being of the community and justify its own existence.*

(*b*) *Second, business must have the capacity to change its methods and if necessary even its objectives. It must be constantly alert to see that its products or services meet or anticipate the needs of the public and to withstand the nipping and eager air of competition, whether it comes from advancing techniques or from new entrants into the field.*

(*c*) *Finally, if it is to be self-perpetuating through growth or modernisation, a business must dispose of its products or services for more than their cost—or, in plain language, it must make a profit. That is true of business whether run by private enterprise or by the State; nor does the political system of the State make any difference to the validity of this notion. Only from the excess of income over expenditure can we finance the expansion of business and science.*

The Role of Money

This brings me again to the reason why I have chosen to talk about business rather than industry. It is an old saying that money makes money; by the same token the production of wealth requires the investment of wealth, and such investment can come from a variety of sources. Traditionally part comes from retained profits—that is, from what economists in the past called the abstinence of the individual manufacturer, or, in today's terms, from the undistributed earnings which companies plough back into the business. Part comes from the banks, though their function in this country has usually been to provide working capital in the form of loans and overdrafts rather than to provide fixed capital like the industrial banks of Germany, which played such a prominent part in the organisation and growth of industry in that country.

Disraeli on Lombard Street

Indeed, we can share Disraeli's surprise that the London money market played such a small part in the financing of the railways. In *Endymion*, published in 1880, he wrote:

> What is remarkable in this vast movement is that the great leaders of the financial world took no part in it . . . even Lombard Street, which never was more wanted, was inactive, and it was only by the irresistible pressure of circumstances that a banking firm, which had an extensive country connection, was ultimately forced to take the leading part that was required.

Today by far the largest volume of capital comes from the investing public as private individuals or financial institutions, working with a vigorous and well-informed Stock Exchange.

Rates of Capital Growth

There is, of course, no exact relationship between the amount of income which a country ploughs back into capital formation and the rate of economic growth which it achieves. Nevertheless, I think that certain generalisations can be offered.

For example, we can compare the experience of the United States with that of this country. Between 1870 and the first world war, the United States devoted more than one-fifth of its national product to home investment, and the United Kingdom only about one-tenth. During that period its national product grew by more than 4% per annum compared with less than $2\frac{1}{2}$% here. More recent history, in spite of occasional and, one hopes, temporary setbacks here, suggests the same lesson: over the past forty years the United States has invested about half as much again in relation to its resources as we have, and its national product has risen at an average rate of about 3% per annum against only about 2% in this country.

I do not wish to strike a note of disappointment so much as to remind you of the classic virtues of abstinence, saving and investment. In fact during the past ten years the amount which the United Kingdom has invested in its productive resources has shown an encouraging growth, with the apparent result that output in manufacturing industry as a whole has increased by some $3\frac{1}{2}$% per annum since 1948, compared with about $2\frac{1}{2}$% between the wars. If science has laid the foundation for much of this expansion, business has provided the will and the means to complete the structure, and both must continue to do so.

High Standards of Living

There is another reason why it is important that this partnership should continue to flourish. We have in these islands over fifty million people who enjoy a material standard of living surpassed in few other countries in the world. Our mineral resources are limited and indeed declining. It is by means of the goods produced by manufacturing industry and the services provided by finance and commerce, in short by business as a whole, that our fifty million are enabled to live, and on the whole to live tolerably well, in an area too small to feed them, at least by present methods.

All this is commonplace; but, like much that is commonplace, it is easily taken for granted until we remember that over 90% of the world's population live in countries less prosperous than our own, most of them in conditions that we should not dream of tolerating. The world does not owe us a living; we can only enjoy the standards which our business enterprise and scientific knowledge enable us to earn through our exports.

Aid for Others

Like all countries whose livelihood depends on their export trade, we have a vested interest in economically and politically stable conditions throughout the world—and I mean stable, not static, conditions. Stability will not be achieved, for example, if plans for industrialisation of the less-developed territories are obstructed from a misconceived notion that we may thereby be able to retain our own markets for that much longer. To those who heard Professor Blackett's plea last year for technological aid to the underdeveloped countries this may sound an unnecessarily narrow approach. But I have deliberately couched my argument in terms of expediency rather than moral compulsion, because it emphasises one respect in which the combination of science and business seems to me to be vital, and it is this: we must concentrate for our own survival on the development of new products and new processes.

Changing Pattern of Trade

Our old staple exports of textiles, iron and steel, and coal, have long since given way to newer lines—vehicles, aircraft, machinery, chemicals and electrical goods. Even here the pattern keeps changing. Motor vehicles, fine and heavy chemicals and so on, are increasingly being manufactured in countries which previously produced only food or primary raw materials. In India, I am told, a company manufacturing diesel engines and electric motors is exporting 30% of its output. Chemicals from Red China and mass-produced toys and torches from Hong Kong are met in many of the world's markets. We are therefore obliged to rely either on selling things which no one else has yet learned to make, or make as cheaply, or on marketing our skill and know-how.

It is not difficult to find examples of what happens to our business when "rule of thumbism" is preferred to operations guided and controlled by science and technology. I think there would be general agreement that at various times some of our traditional industries in which we were pioneers have suffered from the lack of proper scientific direction.

Words of Warning

In my own industry, organic chemicals once experienced the same neglect. The lead that Perkin had given to our synthetic dyestuffs industry with mauveine was frittered away through lack of scientific effort. In the presidential address to the Chemical Society in 1915 his son, William Henry Perkin Jr., referred to this neglect in these words:

> My experience of the manufacturer in this country is that he is usually merely a commercial person who does not like the expert, and especially the idea of giving the expert a prominent position in the control of his works. Possibly the reason in many cases is ignorance of the value of science, but more probably it is due to the fact that being ignorant of science himself, he feels that if the expert is given too much prominence he must either study himself in order to understand the expert or leave the essential control of the business in his hands. Both these courses are distasteful to the ordinary commercial member of a board of directors; the expert

is therefore relegated to the background, and the business comes to grief.

The lesson has not yet been fully learned, for even today we meet this attitude. I have a quotation here from a managing director who went on record last May. The scope of his company may be small and may be provincial, but that the sentiment still exists in minds capable of directorial control is significant. He writes: "The place of the expert is not in the saddle but as the assistant and the adviser. The scientist must be on tap, not on top." Such a relationship is very different from the partnership of science and business that I have in mind.

I have considered briefly some reasons why I regard the partnership of science and business as fundamental. To recapitulate, first it is because, if science is to carry forward our social evolution, it needs the financial and productive effort of business; and second, because the prosperity of this country depends on the technologically sophisticated products of our export trade.

Role of the Engineer

After recounting the story of I.C.I.'s research effort in the discovery and development of the anaesthetic 'Fluothane' (recorded in our May issue), Sir Alexander continued:

I now turn to the functions of design and construction, which are essentially the field of the technologist or engineer. His grasp of scientific principles, combined with the creative skill of a Telford or a Fowler, fits him above all to build a bridge between science and business. It has been said: "The establishment of the class of engineers . . . is the more important because this class will, without doubt, constitute the direct and necessary instrument of coalition between men of science and industrialists, by which alone the new social order can commence." These words of Auguste Comte remain as fresh and as true today as when they were written over a hundred and thirty years ago.

The production or operation function includes the application of technical methods often according to a routine, though it also demands much planning and organisation. Although such work is sometimes considered humdrum and repetitive compared with research and development, it is often essential for it to be done by highly qualified technical men. It is just as great a mistake to believe that unqualified men who come up what used to be called "the hard way" are generally adequate, let alone best for production work, as to hold that good technical people are wasted in such jobs as plant management. On the contrary, they must be encouraged to regard it as an interesting and necessary part of their training for higher management.

Training and Promotion

If there are to be no weaknesses in any one part of the organisation, technical staff may have to be moved from one department to another, and this places a vital responsibility on those exercising the personnel function in selection, training and promotion; at the same time it is their duty to ensure that employees can find satisfaction in their work. This function also can be conveniently performed by a scientist, whose knowledge of what the technical departments require helps him to place staff to the best advantage both of the business and themselves.

On the commercial side also scientists may be needed in sales, sales service or purchasing to achieve the best results for a business making technically complex products. I cannot agree that employment of technical men in commercial departments is necessarily wasteful: it gives flexibility within the business, and can often ensure smoother co-operation when a works manager or research chemist feels that his own, the technical point of view, is understood by a man in one of the commercial departments; moreover, as training for higher administrative posts, commercial experience is invaluable to the scientist.

When he reaches such a post, the scientist, recognising the value of science in business administration, will be well placed to exploit it. I am not thinking here only of new equipment in the office, such as electronic computers or apparatus for sensing letters and figures; science has more to offer than mere tools. It offers the whole philosophy of the scientific approach to the problems of management. I need only remind you of some of the steps involved: definition of the problem, observation and collation of the relevant facts, formulation of a hypothesis or principle, its testing and its general application.

Scientific Techniques

This approach has been of untold value in the examination of human activity and its measurement, which is usually described as work study. It has also been very successfully employed in the problems of supply and distribution, in adjustments of stock levels and in planning of delivery programmes. The full application of such methods usually involves some specialist techniques, especially of a mathematical kind; but even the first qualitative steps of the scientific approach can often lead directly to improvements in business efficiency. All the same, it is worth noting that an otherwise successful application of such techniques can founder on the inability to handle human relationships with proper understanding.

Finance has played a conspicuous part in my address, and in my experience no technological business ever attempts to progress without continually seeking financial advice. However, I have failed to see in this country an equal acknowledgment that financial institutions need to take the benefit of continuing technological advice, though I am glad that some progress is being made in this direction overseas. For example, I know of a bank specially interested in natural resources which employs full-time geologists. Again, the World Bank organisation in Washington employs technical men not only at headquarters, but also to carry out specific missions in various countries. Finance and technology will, I hope, become more and more interdependent as our businesses adapt themselves to current needs.

There is scope, then, for the scientist to infiltrate throughout almost the whole business structure. That being so, it is pertinent to ask, if scientists are to play an important part in business administration, is the balance between science and business likely to be upset? The answer to this question is, I think, threefold.

First, as British industry is at present constituted, the balance is heavily tilted the other way. That is to say, there are still many enterprises which are not employing qualified technical men even in tasks where one would expect to find them, and conversely there are no industries that appear to be harmfully dominated by scientists. This is due partly to the shortage of scientists and technologists with which we are all familiar, but partly also to historical circumstances. In the nineteenth century, due to this country's wealth of practical engineering experience, theoretical knowledge was undervalued. At the same time an educational bias towards the classics, based on an aristocratic tradition, sometimes led the second and third generation of a manufacturer's family to forsake the business altogether for politics or the bar or, if not, at least to be quite unfamiliar with the value of science. Again, as we have seen, in some concerns scientists are relegated to the position of advisers to management and are allowed little part in the active control of the business.

Second, in business where scientists rightly play a prominent part in administration, non-technical men who nevertheless have a good understanding of scientific principles are with advantage sometimes put into semi-technical jobs, and this helps to maintain a balanced partnership.

Third, and most important, the balance that we seek must come in great measure from within the individual himself, a balance provided by the education which the scientist and the non-scientist ought to receive. This, besides being central to my theme, is very much the personal concern of many of us here.

Balance in Education

There are three senses in which we might consider balance in education. The first arises from two different conceptions of the purpose of education. On one hand there is the formation of character, and the development of intellect and personality. At the other extreme is the concept which I suppose finds its most powerful expression in the educational philosophy of Soviet Russia, that the purpose of education is to provide useful members of society in which the desires of the individual must be subordinated to the needs of society.

I do not believe that these two concepts are wholly conflicting or that the second runs completely counter to the British tradition of individual liberty. A balanced educational system should have room for both. The striking successes achieved by the Russians in science and technology are directly attributable to a system of education deliberately designed to produce large numbers of technically trained men and women with the ability to increase the economic power of the country through industrialisation. To this end they established a strong teaching profession to which recruitment is no problem because it enjoys the highest pay and status of all the professions. Though undoubtedly State direction still has a place in the Russian educational system, its purpose is being achieved to an increasing extent by incentives.

We are proud that our universities, despite their growing financial dependence on the State, still retain their academic independence intact. Nevertheless they have quite properly reacted to the stimulus of the country's needs, which have led the older universities, for so long the home of the humanities, themselves to enlarge their science faculties. The new St. Catherine's College at Oxford and Churchill College at Cambridge will give particular prominence to the study of science. The introduction of transfer scholarships to enable promising arts men to turn to science has been readily accepted. More sixth-formers are reading science in the public and grammar schools. Some long-term financial incentives may operate here, but more important has been an intensive propaganda effort which I hope will be sustained by this Association's programme for organising lectures up and down the country on the lines of those so successfully pioneered by the Royal Institution in London.

Wider Understanding

So, in framing our formal education, we cannot entirely ignore the requirements of the society on whose prosperity depend the very conditions in which our educational system can progress; but our society will not be tolerable to live in if its members are not permitted to develop their personalities and talents.

This brings me to the second sense in which I refer to balance in education. I am thinking here of the need for those who study the humanities to have some understanding of the workings of science, and for our scientists to widen their horizons by relating their science to its human context both historically and in terms of the present day. I have in the past on several occasions declared my belief that the gulf which at present separates our scientists and non-scientists is much more easily bridged than is often imagined. For example, the qualities of mind which are fostered by studying chemistry and history are very much alike. Both chemists and historians must cultivate an inquisitive and acquisitive mind. Both need to exercise judgment, leavened with a good measure of scepticism in the exemplary tradition of Robert Boyle. Both must be imaginative, the chemist in advancing hypotheses to predict the future, the historian in doing so to explain the past.

The Russian Example

The merits of a balanced curriculum are recognised in Soviet Russia, where children between 11 and 17 devote something like 46% of their working hours to science subjects, with the emphasis predominantly on mathematics, and another 46% to what we would call arts subjects, with the emphasis here on Russian language and literature. Clearly a correct balance can never be achieved with premature specialisation, which the current demands for entry into many universities impose on our most talented students.

There is a third and final sense in which I refer to balance in education. I have said that we demand, from our scientists and non-scientists alike, intellectual qualities such as curiosity, judgment and imagination. Equally we want our young people, whatever their branch of study, to possess high qualities of character. I need not enlarge on this theme except to say that the society which a balanced partnership of science and business can help to build will as always call for courage, integrity and tenacity. These are some of the ideals that we might have in our minds as we each address ourselves to the problems of education for an age of science.

People and events . . .

90,000 qualify for Profit-sharing Bonus

Over 90,000 employees have qualified for bonus in respect of 1957 under the Company's Profit Sharing Scheme. This is 6000 more than for 1956. This bonus amounts to £4,993,000 gross, which works out to an average per employee of just under £55, which after deduction of personal income tax is £3,716,000. This net bonus has been paid by the Company to the Trustees of the Scheme, who will use it to acquire on behalf of employees £2,866,000 I.C.I. Ordinary Stock issued by the Company for this purpose out of its unissued capital.

This year £1,987,000 Ordinary Stock will be handed over to some 30,000 employees who have 40 or more units of stock standing to their credit, and it is expected that the stock certificates will be sent to them on 14th October. Since the scheme was started in 1954, over 60% of the stock handed over to employees has been retained by them.

Indian Scholarships

Two young Indian students are now on their way to England to study mechanical engineering at the Manchester College of Science and Technology. They are the first two scholarship holders under I.C.I. (India)'s new scheme to grant scholarships for advanced training in chemistry, engineering and allied subjects in the U.K. to ten Indian students in the course of the next five years.

Mr. U. D. Kini, who is 24, comes from Mangalore. He is an engineering graduate of the Indian Institute of Technology at Kharagpur. **Mr. Subir Chowdhury** comes from Calcutta. He is 23 and, like Mr. Kini, is from the Indian Institute of Technology.

Mr. U. D. Kini *Mr. S. Chowdhury*

* * *

Each scholarship is worth £600 a year besides travelling expenses, and there are no strings attached. While in Britain it is hoped that there will be a chance for them to work during the vacations at one of the Divisions. These scholarships are in succession to a similar scheme tenable only at Indian universities.

Winsford's Famous Tides

In August a B.B.C. film unit invaded the Rock Salt Mine at Winsford to film a highly complicated piece of apparatus known as a tidal gravity meter which had just arrived from America. The apparatus, which belongs to Los Angeles University, measures the vertical effects of earth tides, which like ocean tides are caused by the moon and the sun but are very much milder. It automatically records the daily variations in the pull of gravity in the earth's crust due to the tides by measuring the change in weight of a mass of metal caused by the changes in the pull of gravity—it is sensitive to changes in weight of one part in a thousand million. It is complementary to the instruments permanently kept in the mine by Cambridge University physicists as reported in our January issue.

Winsford is one of the dozen sites all over the world chosen for these observations, which are part of the university's I.G.Y. programme. About a month is being spent at each point. The man in charge of the apparatus is Dr. J. C. Harrison of Los Angeles University's Institute of Geophysics. He is the son of **Dr. C. F. R. Harrison**, Work Study Manager at Wilton.

Sharp Shooting

The Bisley meeting held at the end of June was one of the best ever for Metals Division. **Mr. Tom Knight**, who works in the Proof Department at Witton, won the British Small-bore championship from over 400 competitors, bringing this title to Witton for the third time since the introduction of I.C.I.'s ·22 target cartridge, 'Tenex,' in 1951.

Besides this premier trophy the Metals Division team also won five other individual cups and two team awards and contributed to the international teams when **J. Hall, A. D. Skinner** and **W. B. Godwin** shot for Britain in the Dewar Trophy match. In the Home Countries International **Messrs. Knight, Godwin, Skinner** and **Walmesley** shot in the English team, the latter making his first appearance in an international match.

Mr. T. Knight

Official Opening

On Saturday the Earl of Derby, who is Honorary Treasurer of the National Playing Fields Association, is to open Billingham's new sports field. After the ceremony there will be an athletics meeting—the Amateur Athletics Association have promised to send a team—followed by Synthonia soccer section's first Northern League home game of the season. The visitors are Bishop Auckland, who have won the F.A. Amateur Cup more times than any other club.

The quarter-mile running track has been certified for accuracy by the A.A.A. The new grandstand, completed last month, which flanks one side of the track has accommodation for 400 seated and 1850 standing, and there are offices and dressing rooms for players and officials underneath.

Pensioner's Portrait

A portrait in pastels of **Mr. William Henry Pickford**, a former Lime Division employee, is now hanging in the Royal Academy's Summer Exhibition in London. It is the work of Eric Kennington and was done in 1944 for the famous series of I.C.I. advertisements "Portraits of an Industry."

The portrait was afterwards given to Mr. Pickford by the Company, and he has loaned it back to the artist for this exhibition. Mr. Kennington says he considers it the best thing he has ever done.

William Pickford, who is now 74, retired from the Company in 1948 after completing 51 years' service. Right up to his retirement he was working as a stone filler—perhaps the toughest job in the quarries.

Outward Bound Honours

An 18-year-old student apprentice at Billingham, **John Tarn**, has won an honours award for his work on an Outward Bound course held at Eskdale Mountain School in the Lake District. This is the third honours award to be gained since Billingham Division first began sending apprentices and other young employees on Outward Bound courses six years ago.

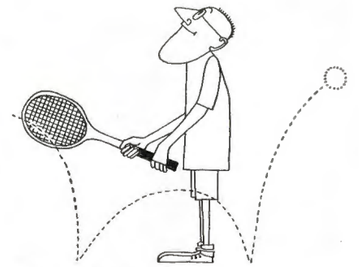
Mr. John Tarn

With John Tarn on the course were two other Billingham apprentices—**Charles Pennock**, who is training to be an electrical fitter, and **James McGlone**, an apprentice fitter.

This year about forty boys and a dozen girls from various Divisions of the Company are being sent on Outward Bound courses.

Seeing Red

When ex-Wimbledon champion Frank Sedgman and Rex Hartwig found difficulty in seeing tennis balls against the almost white background of the wooden floor during exhibition matches at the Melbourne Olympic stadium, they sought the advice of I.C.I.A.N.Z. Dyes Division. A couple of balls were coloured orange and a couple yellow to test for visibility against the floor. The orange shade was at first selected, but further balls dyed scarlet proved even better.



Dyeing the balls gave I.C.I.A.N.Z. quite a headache. The covers of the balls were 80% wool and 20% nylon and 'Terylene,' so wool dyes were tried first. They did not give the right depth of shade because the balls had to be dyed at a low temperature to preserve their pressure. The dyes finally used were I.C.I. Dyestuffs Division's new 'Nylomine' range, made specially for nylon. With these the right shade was obtained in only ten minutes immersion at 100° F.

Explosives in the Mines

A book, *British Coal Mining Explosives* (Newnes, 27s. 6d.), by **Dr. James Taylor**, I.C.I. Main Board Director responsible for Metals and Nobel Divisions, and **Dr. P. F. Gay** of Ardeer Research Department, has been enthusiastically reviewed in the technical press.

Writing in the *New Scientist*, Dr. H. C. Grimshaw says: "To compile a book covering such a range as this does, one of the main difficulties is to present adequate technical information in a sufficiently simple, lucid manner. The authors have succeeded in this."

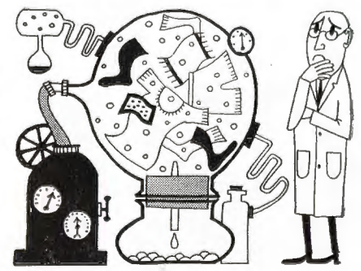
Upwards of 100 million shots are fired annually in British collieries; yet, as the authors point out, the subject has not been dealt with comprehensively in any single reference book. Dr. Taylor and Dr. Gay set themselves to remedy this and in doing so have written a book which will appeal both to the student and to the man in the mine.

The book begins with the history of mining in Britain and with the early use of explosives in coal mining. It goes on to describe the development of modern explosives, the law governing their use, modern detonators, I.C.I.'s "Eq.S" explosives, special techniques and devices for winning coal, and all the background speculation and theory.

Clean Chemicals?

Eighteen Hoover washing machines in the microbiology department at the Akers Research Laboratories at Welwyn are put through about five years' normal wear and tear in a fortnight. Not that they are ever put to the test with a batch of dirty washing. These machines are specially modified for the culture of penicillin and gibberellic acid moulds.

Why washing machines? In the early days of gibberellic acid production back in 1952 the problem was to find a suitable method of constantly stirring and aerating the solution in which the mould is grown. Equipment specially designed for the job cost about £1000 a unit. Then someone hit on the idea of adapting an ordinary washing machine.



A machine was bought. An air intake pipe was substituted for the drainage outlet, and a new lid was fitted incorporating a heat exchanger to keep the solution at a constant temperature, and holes for filling the tub with the food materials on which the mould is grown and for running off the excess froth. Trials soon showed that it did a good job and very cheaply. Now the Hoovers are being used for penicillin fermentation too.

The original washing machine is still in use at The Frythe. An average fermentation takes 300–400 hours, so this machine has been put through something like 200 years' normal domestic use.

Success Story

THE I.C.I. anaesthetic 'Fluothane' has been used for the first time in the world in a Melbourne, Australia, hospital for a particular type of open heart operation in which the circulation is stopped for several minutes. Of the dozen operations so far performed eleven have been completely successful, and the one failure was not in any way due to the use of 'Fluothane.'

The success of 'Fluothane' as the anaesthetic for this purpose is due to the work of Dr. Robert Orton, director of anaesthesia and resuscitation at the Alfred Hospital, Melbourne. Before the advent of 'Fluothane' such operations were performed either with the use of a machine to take the place of the heart and lungs, or by hypothermia —the "deep freeze" method. Now 'Fluothane' does away with both these methods except in cases where the blood circulation would be shut off for more than eight minutes, in which case a heart-lung machine is used to avoid damage to the cells of the body due to prolonged lack of oxygen.

* * *

Asked what he thought of 'Fluothane' Dr. Orton said that carefully administered it is a good general anaesthetic and is particularly valuable in brain surgery, plastic surgery and chest operations. Because it causes a fall in blood pressure it can be an advantage by keeping bleeding to a minimum and so giving the surgeon better vision. Equally important, he said, was the extra time 'Fluothane' allowed for the deliberate arrest of the circulation during open heart operations.

The first operation with 'Fluothane' took place in January 1956 at the Manchester Royal Infirmary. Since last autumn, when it was declared ready for general release, it has been used in more than 100,000 operations.

To Spain the Hard Way

AMONG the twelve British boats which took part in the Sail Training Association's races run between Brest, Corunna and Las Palmas last month were three entries from the Island Cruising Club, which has its headquarters at Salcombe in Devon. Two of the crew of the I.C.C.'s *Hoshi* were I.C.I. employees. **Miss Norvella Forster** works in Head Office Development Department. **Dr. John Wood** is in Dyestuffs Division's Polymer and Chemicals Service.

More than fifty vessels from twelve countries took part in the races. The prizes and trophies for the races were given by Monsieur Coty and General Franco. This is the second time the race has been run. Two years ago the course chosen was from Torbay to Lisbon.

Miss Forster first became seriously interested in sailing as a member of the London University Sailing Club. She has also been an honorary instructor for some of the sailing courses organised by the Central Council for Physical Recreation. Dr. Wood is a prominent member of the Island Cruising Club and is on their Northern Section committee.

Rescue Bid

A GALLANT rescue attempt by a bricklayer at Dyestuffs Division's Huddersfield Works, **Mr. Horace Balmforth**, was praised by the coroner at the inquest on 7-year-old Phillip Lorriman, who was drowned in a mill dam at nearby Milnsbridge.

Mr. Balmforth was waiting for a bus on his way to work when two young women who had already tried without success to rescue the child called for help. He ran the 200 yards to the edge of the dam and plunged in partly dressed. There was no sign of the boy. Eventually he found him on the bottom of the pond and brought him to the surface. But in spite of artificial respiration the boy died.

Mr. H. Balmforth

Spider Experts Meet

DURING July an International Congress of Zoologists attracted nearly 2000 zoologists to London from all parts of the world. The opportunity was taken by **Mr. W. S. Bristowe** (head of Central Staff Department) to arrange a rather unusual get-together of not less than twenty experts on spiders drawn from many parts of the world, including New Zealand, the Argentine, the U.S.A., Hungary, Angola and Germany. Three of the Englishmen present were on the point of retiring from their jobs at the British Museum and from schoolmastering, so in the course of a brief address Mr. Bristowe expressed the hope that they would gain encouragement from the example of two other English spider experts, C. Warburton and the Rev. J. E. Hull, who at the present time are 104 and 96 respectively. Mr. Warburton won the *Sunday Times* crossword competition on his hundredth birthday, and Mr. Hull published a paper as recently as three years ago. Is there something in the old belief that spiders are lucky?

Bottom of the List

IN 1955 a patient had the wrong finger amputated because "little" was mistaken for "middle" in the doctor's directions. This somewhat alarming tale introduces a new book about handwriting by Mr. Reginald Piggott.

In it the author summarises the findings of his one-man survey of British handwriting—through appeals in the national press he received no fewer than 25,000 specimens. He suggests that the idea of doctors being the poorest writers is a myth that is about to be exploded. Scientists and engineers, he claims, are quite as bad, if not worse. They rank with artists

and company directors as the most guilty of bad writing, while high on his list for readability are clergymen, teachers and—a surprising one—members of H.M. Forces.

Mr. Piggott produces no instance of the dire results of a scientist's bad writing to match his medical story, so we invite readers to fill the gap. A small prize is offered for any stories published.

Old-established Agents—4

IN 1900 Thomas Geddes Grant, a Canadian from Nova Scotia, opened his own agency in Port of Spain, Trinidad. I.C.I.'s association with the agency dates back to 1921, when T. Geddes Grant Ltd. were appointed agents for Nobels Explosives Co. in Jamaica. Besides Jamaica the agency also had by this time branch offices in Barbados and British Guiana. Thomas Geddes Grant later became the first Canadian trade commissioner to the British West Indies—excluding Jamaica, which had a trade commissioner in its own right.

Thomas Geddes Grant died in 1934. He was succeeded by his eldest son Frederick. The present managing director is his second son, Kenneth Lindsay Grant. The company is still very much a family firm, and there are today three directors who bear the name Grant.

Frederick Grant started the great family tradition of cricket—it has often been jokingly asserted that no one could get a job with the Geddes Grants unless he was a cricketer—and in his day captained Trinidad. Two other brothers, Jack and Ralph Grant, were cricketing blues at Cambridge and later captained the West Indies team.

Today T. Geddes Grant Ltd. handle a wide range of I.C.I. products in Jamaica, Trinidad, British Guiana, Barbados, and the Windward and Leeward Islands.

Quote of the Month

"IF you can keep your head when all about you are losing theirs, maybe you just don't understand the situation!"—"Peterborough" of the *Daily Telegraph*.

NEW APPOINTMENTS

Some recent appointments in I.C.I. are: **Dyestuffs Division:** Dr. H. A. Hampton (Manager of Polymer and Chemicals Service Department), Mr. H. E. Stagg (Division Chief Analyst). **I.C.I. (Export) Ltd.:** Mr. G. Wilkinson (Resident director in Calcutta). **Metals Division:** Mr. W. Brittain (Assistant Accountant). **Paints Division:** Mr. P. D. S. Shrimpton (Director). **Paper Goods Manufacturing Co. Ltd.:** Mr. E. Bradley (Secretary and Chief Accountant). **Plastics Division:** Mr. A. F. Gawler (Director).

NEWS IN BRIEF

World Shooting Championships. Mr. Frank McCormick (C.I.L.) was manager of the twelve-man Canadian team which competed in the world championships at Moscow last month. C.I.L., I.C.I.A.N.Z. and Metals Division all provided ammunition for their national teams.

The Two Million Mark. Marston Excelsior's Fordhouses Factory and Alkali Division's Winnington Works each recently achieved two million hours free of lost time accidents.

For Handicapped Children. The Plasterboard and Gypsum Plants of Casebourne Works, Billingham, spent some of the money won as a result of their good safety and plant tidiness records on giving forty handicapped children from a Middlesbrough home a seaside outing. They joined the plants' annual children's outing to Seaburn.

Lebanon Disturbances. During the recent disturbances in the Lebanon **Mr. Husni Mikdadi**, who is head of the agricultural department of I.C.I. Export's Beyrouth office, was injured by splinters from a bomb set off in one of the main markets in Beyrouth. He was detained in hospital for a few days for treatment. He has been in the service of the Company for 30 years.

Mr. J. R. A. Glenn, I.C.I.A.N.Z. Managing Director, has been invited to join the Interim Body of the Industrial Design Council of Australia.

Pensioners' Excursions. Since summer outings for retired employees and their wives were started at Billingham in 1952 the number attending has doubled, and this year nearly 1500 people went on the five outings organised to Scarborough.

Mr. R. A. Banks (Personnel Director) is a member of the new Industrial Training Council which was formally established in July. At the outset the Council will review the problems presented by the impending "bulge" in the number of school leavers.

All his Own Work. The Scottish Model Yacht Association's A Class championship has been won by **Mr. John Bissett's** *Gay Gordon*. The yacht was designed, built and skippered by its owner, a chemical plant worker in the Ardeer Detonator Department.

Dr. J. C. Swallow, Plastics Division chairman, has been elected president of the Plastics Institute for 1958–59.

Mrs. J. Turnbull (Wilton Travel and Visitors Dept.) took time off from booking other people's airline reservations to go on a flight herself. She was a guest of B.O.A.C. on a demonstration flight in a new 81-seater Bristol Britannia skippered by the Queen's pilot, Captain McKenzie.

Mr. Jack Cannon (Ardeer Factory), the Ayrshire golf champion, reached the last 16 in the Scottish amateur golf championship. He lost to I. R. Harris, a former member of Nobel Research Department, who was runner-up.

Endurance March. Three Billingham employees, Messrs. **Breckons, Malcolm** and **Mason**, all members of B Company of 17 Parachute Regiment stationed at Norton, took part in the 100-mile Nijmegen endurance march. Civilians as well as services representing almost every country in N.A.T.O. took part in the march, which was instituted 42 years ago. The oldest competitor was 96.

Royal Tour. Among those introduced to the Duke of Edinburgh when he visited Merthyr Tydfil during his South Wales tour were three I.C.I. Dowlais Factory employees, **Dr. P. G. Harvey** (Works Manager), **Mr. T. Y. Lewis** (Dowlais Day Gang), and **Mr. Bryn Watkins** (Dowlais Time Office and a former mayor of Merthyr).

Lost Property? During recent excavations at Lostock Works, Alkali Division, a set of Brunner-Mond spanners were found in a foundation block. Due to oil and clay found surrounding them, the spanners are still good enough for use. Investigations to trace the last tradesman to dismantle the plant have failed.

Men with Ideas—8

Walter Boast

TINS of paint leave the Small Order Department of Paints Division's Stowmarket factory at the rate of several thousand a day. The tins are already lithographed when they are filled, but after filling the batch number and colour description must be added.

This is done by a rail printing machine—the tins roll down it by gravity, picking up the printing as they go. Three girls used to run the printing rail, and one of them had to re-ink the type face with a roller after every third tin. To Walter Boast, who is in charge of the girls in the Small Order Department, this did not seem good enough.

He worried the problem like a terrier and finally came up with a solution. A foreman fitter told him it was feasible, and a work study course which happened to be running at the time translated the suggestion into practical terms.

Each tin running over the printing rail now operates a system of compressed air valves and tubes, which in turn cause the inking roller to re-ink the type face. The printing is better and clearer, one girl has been released for other work, and Walter Boast is the richer by £120.

THE CATHODE-RAY TUBE

By C. R. Evans (Central Instrument Laboratory)

This everyday wonder, heart of a television set, depends upon the effect of electrons on a fluorescent screen which converts the energy of the electrons into light. The foundations of this knowledge were laid as long ago as 1879 by Sir William Crookes working in his private laboratory at 7 Kensington Park Gardens, London.

ALMOST a hundred years ago, the German physicist Plücker, experimenting with electrical discharges in a glass tube, noticed that a fluorescent glow appeared on the glass at the end opposite to that at which the negative wire was connected. The position of the glow was affected if a magnet was brought near the glass, and Plücker concluded that the glow was caused by something originating at the negative electrode and striking the glass at the opposite end.

Shortly afterwards it was shown that a solid object in the path of the "rays" would cast a shadow in the luminous glow on the glass. Further experiments very soon led to the suggestion that the rays consisted of minute particles, each bearing a negative electrical charge. In 1879 Sir William Crookes (discoverer of the "Crookes lenses" used in sun glasses) conducted some ingenious experiments and discovered that when the rays impinged on certain chemical substances light was emitted.

Thus were laid the foundations on which the complexities of modern electronic technology are built. These early experiments led also to the development of our knowledge of the atom: they were the first steps which were to develop into the giant strides of twentieth-century scientific progress.

The modern cathode-ray tube, with which we are all familiar as the heart of the television receiver, differs very little in principle from its predecessors of the Victorian age, but its perfection and application had to await the invention and development of the "valve" now widely used in radio and other electronic devices. This too makes use of the tiny charged particles—now known as electrons —observed in the early electric discharge tubes.

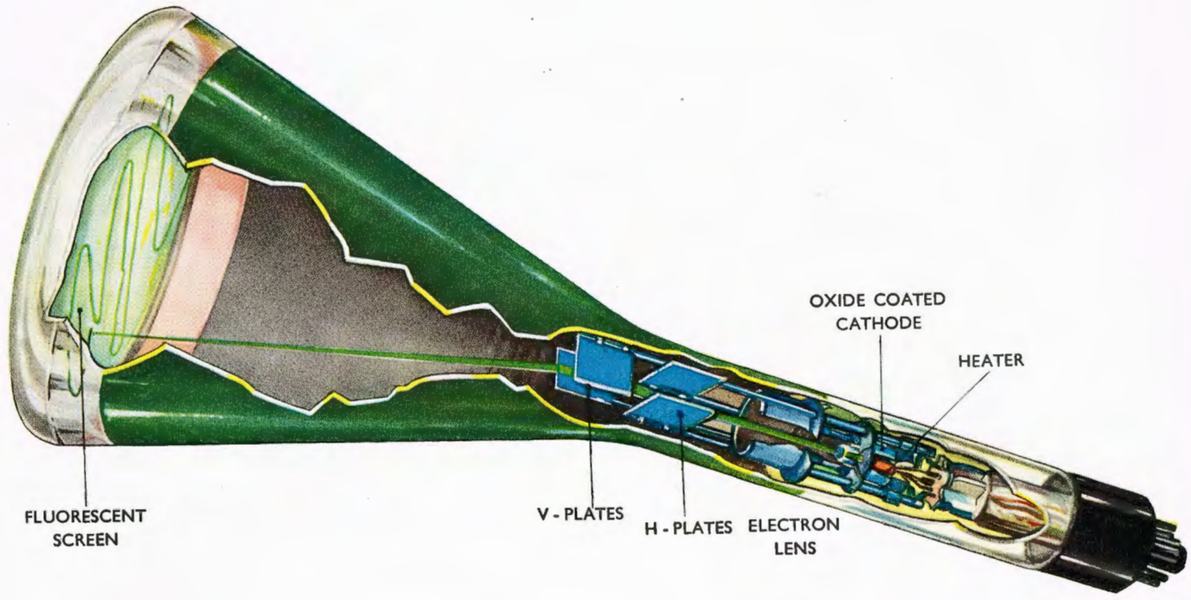
To understand the operation of the cathode-ray tube we must know a little more about electrons. They are a constituent part of all atoms, and in a piece of metal the electrons are free to wander about among the metallic atoms. Since they each bear a minute negative electrical charge, they are attracted by positively charged bodies and repelled by negatively charged ones. Thus, by connecting a battery to a wire we can make the electrons move along the wire towards the positive terminal of the battery: this is the familiar electric current. Similarly, a body with a sufficiently strong positive charge may, if placed near to the metal, attract the electrons completely out of it.

Once released from the metal, the movement of the electron may be governed by the presence of other charged bodies—usually in the form of metal plates. A free electron moving about in air makes frequent collisions with the atoms of the air, so that if we wish to make the electron follow a chosen path it is necessary to operate in an enclosure from which all the air has been removed.

When a metal is heated the random movement of the electrons becomes more energetic, and some may escape from the metal without any other influence. In this way the behaviour of the electrons is similar to that of the particles of a liquid, some of which escape from the surface as vapour. Thus, just as a cloud of vapour forms near the surface of a relatively hot liquid, so a hot metal is surrounded by a swarm of electrons. These, being free from the metal, can be guided by electrical forces applied from nearby metallic plates or electrodes.

The electrons are infinitesimally small and light—only about one two-thousandth of the weight of a single hydrogen atom, which is itself so exceedingly light that a million million million of them would together be just about detectable by our most sensitive chemical balances. Because of this, negligible power is required to accelerate and deflect the electrons. In the cathode-ray tube the electrons may travel at speeds of many thousands of miles per second.

Referring to our picture of the cathode-ray tube, we may now follow the course of the electrons through the tube. Electrons are liberated from the cathode or negative electrode, which is heated electrically. The glow from the cathode is usually visible through the side of the tube and sometimes through the front screen, particularly when the latter is wearing thin and an expensive replacement is in the offing!



Next to the cathode is a metal cup with a hole in its centre, through which a narrow beam of electrons may pass. If this cup is made electrically negative, it will repel the electrons, and only the faster ones will be able to reach and pass through the hole. So, by varying the negative voltage here, we can control the intensity of the electron beam, and consequently the amount of light produced at the fluorescent screen.

Beyond the metal cup is a group of electrodes forming an electron lens—so called because its effect on the electron beam is very similar to that of a conventional lens on a light beam. The lens electrodes are made electrically positive, and electrons travelling along the tube axis are merely speeded up, but those diverging from the axis are bent round towards it. All the electrons thus tend to converge to a point further along the tube axis. If the lens voltages are correctly adjusted this convergence takes place at the screen, which is formed by coating the inner surface of the end of the tube with a fluorescent chemical.

This substance is able to convert the energy of the electrons into light, so that we now have a fine, bright spot on the face of the tube. We have already seen that the brilliance of the spot can be varied, but to make use of it we must also be able to vary its position on the face of the tube.

To achieve this there are two pairs of parallel plates fixed beyond the electron lens. If the upper plate of the pair is made positive or the lower one negative, the electrons, being negatively charged, will move upwards while passing between them. The beam will be bent up, and the luminous spot will move towards the top of the screen. Reversing the voltages will cause the spot to deflect downwards. In a similar way the plates mounted at right angles to the other pair are used to deflect the spot to left or right. Incidentally, in the larger tubes these deflections are produced by electric magnets.

Now, a television receiver is simply the result of utilising both deflection and variation of brilliance of the spot. The spot is made to scan the face of the tube, much in the same way that we read a book, from left to right and, line by line, from top to bottom. As it does so, a similar device in the television camera is scanning the original scene in exactly the same way. As the electron beam skims across the face of our receiver tube, its intensity is made to vary in accordance with the amount of light at the corresponding part of the original scene, so that a replica is "painted" on the screen. Each view is built up of about 400 lines, and the whole is repeated twenty-five times a second, which means that during a single second's viewing of a 17 in. screen the light spot has travelled more than six miles!

So if you enjoy your television programme, or if, on the other hand, you agree with the rather cynical newspaper critic who dubbed the television tube "the idiot's lantern," spare a kind thought for the nimble electron and for the many scientists whose contributions to a century of progress made it all possible.

Costa Rican Coffee

By Ernest Hainsworth

Colour photographs by Gordon Douglas

How many of us know how coffee is grown? Last summer two Plant Protection scientists visited Costa Rica to study coffee plant diseases. Here they describe how the Costa Rican farmer grows and harvests his coffee crop—a way of life in which beauty and tradition still find a place alongside a progressive outlook.

I wonder how many coffee drinkers have the slightest idea how the coffee they drink is grown? How many of them know that the coffee bean is really the counterpart to the stone in a cherry and, like the cherry stone, is encased in soft red fruit when ripe? This fruit is removed before the bean is dried to become the coffee which we drink.

Each of the bright red "cherries" of coffee contains two beans, which when used for seed are planted in nursery beds under shade. At a year old these plants are replanted in their permanent site.

Usually a field of an acre or more is planted at a time. The young plants grow rapidly, and by the time they are four years old they have formed trees not unlike young holly trees, about 8 ft. high. Various methods of pruning are adopted to promote the formation of more than one main stem and thus increase the bearing area. Flowering takes place during summer, the flowers being borne in the axils of leaves.

The fruit is at first green, turning through orange to bright scarlet, and the harvest takes place over a period of several weeks at the end of the year. The business of planting, pruning, cultivation, and keeping down grass and weeds is the work of the peons or peasants, but for the harvest the whole family turns out, being paid by piecework on the volume of berries harvested.

Collecting the berries and bringing them to the factory is a colourful scene. The berries are measured from wicker baskets into ox carts, many of these brightly painted in vivid patterns. The painting of these ox carts is a matter of great importance in Costa Rica, and on the National Day the annual celebrations begin with the blessing of the freshly painted carts.

When the labourers take their midday meal there is usually someone with a guitar to provide the authentic Latin-American background. This is the only meal the men take during the whole working day of ten or eleven hours, maintaining themselves by occasional pulls at a bottle of cane juice with the colour and consistency of stout.

On arrival at the beneficio or factory the cherries are first passed between abrasive rollers or pulpers to remove the fleshy covering and then washed down into fermenting tanks, where the mixture is allowed to ferment for 48 hours in order to hasten the removal of the pulp. After washing and grading, drying takes place in large rotating drums, although in the smaller beneficios the beans are simply spread out on flat concrete patios to dry in the sun. The dry beans are then packed in sacks and shipped raw, roasting taking place in the consuming country. In the case of Costa Rican coffee, this means mainly Germany and the United States.

Coffee is the major export of Costa Rica, and the country's day-to-day economy is dominated by the current market price of coffee in New York. Costa Rica also exports bananas and cocoa, produced in the flat coastal areas of the country on the giant plantations of the United Fruit Company. Coffee, on the other hand, is produced almost exclusively on estates or haciendas owned by smallholder Costa Rican farmers.

The coffee growers are progressive. When a coffee grower has success in putting a new idea into practice, he is keen to hold the equivalent of a farm walk to demonstrate his success to his fellow growers. The farm walk consists of a succession of dashes in jeeps or Land Rovers up and down the steep tracks of the estate, terminating in a barbecue lunch, at which whole sides of beef roasted in the open after being stretched flat on huge gridirons are offered. On these occasions you serve yourself with your own knife carried on the belt.

Turrialba, in the Heredia district of Costa Rica, is the focal point of much of the pioneer agricultural research of Latin America. Here is the Inter-American Institute of Agricultural Science, supported by contributions from every Latin American country. Plant Protection Ltd. were favoured with an invitation to carry out research work there, and Gordon Douglas and I were indeed fortunate to be selected for this job. We spent three months there between August and November last year.

Cultivated coffee is subject to two major diseases—coffee rust and coffee leaf spot. Coffee rust, which wiped out the coffee industry of Ceylon a century ago, is confined to coffee grown in the Old World, and so far has never spread to Central and South America. On the other hand, New World coffee is severely afflicted by coffee leaf spot, which has never spread to Old World coffee. For us to find out the best way to control coffee leaf spot it was therefore essential to work with coffee growing in the New World.

Ripe coffee cherries. *Each cherry contains two coffee beans.*

Accordingly we planned to evaluate various fungicidal groups for their performance against coffee leaf spot. The appearance on the leaves is of brown spots, about the size of a drawing pin. When the spots are examined with a lens, the bright yellow fruiting bodies of the fungus can be seen growing within the periphery, looking like a miniature fairy ring.

During heavy rainfall the tiny heads of the fungus become dislodged by splashes of rain, and if they fall on to a coffee leaf they become attached, germinate, and eventually produce another spot. Badly attacked leaves fall off, and as defoliation progresses the plant becomes weakened and the crop is reduced. When the cherries are attacked, the berry inside becomes valueless.

Although the method of dispersal of the fungus is crude and the rate of spread so extremely slow that it is not unusual to find uninfected plants side by side with heavily infected ones, the disease is ubiquitous in Latin America, not only on coffee but on some two hundred other host plants equally susceptible to attack by the fungus *Mycena citricolor*. Among these hosts are several species of the genus *Inga*, commonly used as a shade plant for coffee.

Our work produced some interesting results, from which it is hoped that we shall be able to extend sales of some of our products for use in coffee growing in Latin America.

Today coffee production in Brazil dwarfs that from the rest of the world. In fact Brazil grows very nearly half the world's supply. But in terms of production per acre Brazil is not among the leaders, for almost all Brazilian coffee is grown on the extensive system, with little attention to those operations coming under the heading of crop husbandry. At the other end of the scale are countries which produce intensively, with money and thought going into the producing system and coming back in the form of higher yields. Costa Rica is among these. Where intensive production is the rule it is usually the case that producers, led by a nucleus of progressive growers, are more receptive to ideas which might lead to higher production.

Among progressive coffee producing countries the little republic of Costa Rica today holds special attractions to the British exporter by reason of its readiness to trade in sterling. One of the few countries in the world with a long-continued favourable trade balance, Costa Rica exports coffee of the very finest quality grown in a pleasant climate by a people with the well-founded reputation of possessing the most beautiful girls in the world.

Ox cart taking *coffee cherries to the beneficio at harvest time*

Hand-painted Costa Rican ox cart, *typical of the care with which the Costa Rican farmer looks after his equipment*

Unloading ripe coffee cherries *at the beneficio*

Costa Rican girls *in national costume at the ceremony of blessing the oxen and their coffee carts*

Fermentation tanks *in which the pulp is separated from the coffee bean*

Coffee beans *drying in the sun being turned by hand*

The Fort Henry Experiment

By P. C. Allen

At Fort Henry on the shores of Lake Ontario the way of life and dress of the garrison that guarded the Canadian frontier with the United States in the 1860s has been re-enacted down to the last detail.

Colour photographs by V. Brais, Kingston, Canada

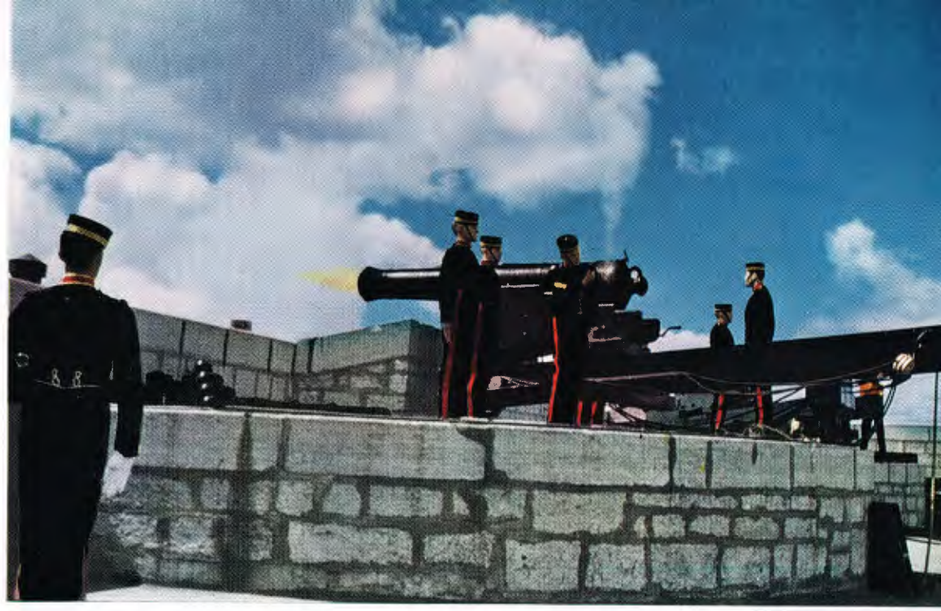
At Kingston, on the shores of Lake Ontario in Canada, a most unusual experiment in time has been conducted by the Province of Ontario. It is nothing less than the reconstruction, down to the last detail, of the way of life of the historic garrison at Old Fort Henry, which used to protect the frontier after the United States broke away from British rule. It stands on Lake Ontario at the point where the Rideau Canal leads away from the chain of Great Lakes to the Ottawa River.

Down to the last detail is no exaggeration. With loving care the task of rebuilding the fortress stone by stone was undertaken in 1936, partly as a means to combat unemployment. Not only the stone walls and fortifications themselves, but also the interiors of the living quarters, magazines and storerooms were brought back to life. The officers' quarters are now furnished with the furniture of the period, some of it originally in the Fort itself; and the rather grim casemates where 350 men slept nineteen to a room can be seen as they originally were.

The officers with their elegant quarters and mess were not allowed to keep their wives in the Fort. But the same rules did not apply to the rank and file. Sometimes as many as three families with children shared a single casemate 36 ft. by 18 ft. A soldier's wife was allowed half a soldier's ration, which consisted mostly of meat and vegetables boiled in huge cast iron kettles to make a stew; bread baked in the Fort; and tea. If the soldier died the wife's ration immediately stopped, so she had to marry again in a hurry or starve. Several children were born in the Fort and some were baptised there, one to be named Fort Henry Bates.

What has made all this come to life and not be just a cold dead museum is the Fort Henry Guard, a body of Canadian university students employed at the Fort during the summer. They garrison the Fort, wearing the military uniforms and equipment of 1867, and enact for the public with strict military discipline the drill and tactics of that time. Uniforms and accoutrements are made in the Fort's tailor's shop, exact down to the last detail; the boots, which I particularly admired, are "half-Wellingtons" made in the Fort. Cannons, guns and rifles are the originals of 1867; drill is carried out in accordance with the drill books of the time; and the first Drill Sergeant of the 1938 Fort Henry Guard was an old man able to remember the drill of the nineteenth century. Today the Guard move with the smartness and esprit de corps of a crack military unit.

All this has been created not only with zealous enthusiasm but also with meticulous care and loving attention to details. As always in such circumstances, one man, Mr. R. L. Way, stands behind it all. It is he who has imposed the rigorous standards which render the whole performance of the Guard a genuine re-creation of historic scenes and not just an amateurish pageant by some young actors.



No. 2 gun fires *a dawn salute*

The Guard consists of a squad of infantry of the line in scarlet and blue, with a tall shako; a troop of Garrison Artillery gunners in dark blue with little pillbox hats who fire the muzzle-loading guns on the ramparts; the drum and fife band, with the drummers in scarlet and fifers in white tunics; and, last but by no means least, David the goat, the mascot of the Fort Henry Guard, presented by the Toronto Welsh Society to commemorate the stay of the Royal Welch Fusiliers at Fort Henry in 1842–43. Incidentally, Mr. Way told us that "Officer Billy," the goat of the Welch Fusiliers, was in the front of the battle with the troops at Bunker Hill.

The fame of the Fort Henry Guard has now spread far and wide. They have paid a visit to Washington as the guests of the United States Marines, who did them the signal honour of presenting one of their drums—a very rare gift indeed. More recently the Fort Henry Guard came to the Royal Military Tournament at Olympia and were the principal feature of the show there in 1956.

Members of the Fort Henry guard *with Officer Billy, the goat mascot of the Fort*

I visited the Fort on 1st July 1957, Dominion Day, ninety years exactly from the founding of the Canadian nation. In honour of the occasion there were parades of the band, displays of close order infantry drill, and a regular fusillade of cannon fired from the walls under the eye of a bearded Pioneer Sergeant. Then out came the goat to march and countermarch. It was a fine display.

THE NOT-SO-GOOD OLD DAYS

By Philip C. Pratt

Forty-odd years ago Philip Pratt was a works office clerk with Chance and Hunt Ltd., later to become part of General Chemicals Division. He looks back on a tough life that would be unthinkable nowadays, but one enlivened by many a good joke.

IN 1907 I began work as a junior clerk in the fancy goods department of a wholesale tobacco merchant at 5s. a week. The hours were from 8 a.m. to 6 p.m. and 1 o'clock on Saturdays. Overtime at bank holiday periods was compulsory and unpaid, 6d. being allowed for tea.

By May 1911 I was looking for something better and eventually secured an interview at the home of the late Clinton F. Chance for a post in the works office of his company. He sent me to see his chief clerk and personal secretary, R. Morris. On the 20th of that month, therefore, a callow youth of 19, I walked through the doors of Chance and Hunt Ltd. for the first time and was taken to Dick Morris's office.

W. A. S. Calder, *General Manager of Chance and Hunt Ltd. in* 1911

"What's he sent you to me for?" he demanded.

"Well," I replied diffidently, "he said something about a test."

"*I* can't give you a test," declared Morris. "You'd better report to Mr. Calder at the works office on Monday"; and so began my long association with the Company.

The hours were from 8.30 a.m. to 5 p.m. Saturday was not so good and might be as late as 4 p.m., depending on how the figures came in from the works for the return for the week that had to be sent by car to Clinton Chance that afternoon. We had to do our own typing and also to include Wednesbury and Cwmbran figures in our return.

Dinners were provided free by the Company; and although overtime was not paid there was less of it and the tea was better. Also, the salary was 15s. a week, which in those happy days was enough for a single man to live on. After all, a labourer could and did bring up a large family respectably on a pound a week. Our highest-paid foreman earned only £2 and a young chemist or engineer considerably less.

On the whole, then, despite a five-mile bicycle ride twice daily in all weathers, the balance was on the credit side. Nevertheless, my first taste of factory life did not impress me very favourably. In those days the works office in any chemical works was a sort of "flat stone" under which crept various creatures tolerated, but hardly accepted, by the loftier general office departments. The type of clerk employed was not distinguished; yet Calder had managed to collect around him a staff whose I.Q. must have been of a high order, as they tackled the job with surprising ability.

The works office was very much taken for granted. It produced reliable process efficiencies, accurate cost figures, fuel costs, and wages sheets calculated on the most complex bonus systems. It paid out the men on Friday nights, fixed rates for process jobs, prepared samples, and carried out the whole of the process stocktaking by measure or estimate. All these jobs were, as they still are, of a specialised technical quality and could only be learned by long and often bitter experience.

Running continuously through our lives was the sound of Calder's bell. A hundred times a day its shrill note would send the junior scurrying through the works, then far more of a rabbit warren than it is today, to find someone, chemist or foreman, whom "Uncle Bill" Calder wished to interview at once if not sooner. Long before he could get back the bell might ring again and the next in order be despatched for someone else—or perhaps to

Chance and Hunt Works *as it looked in* 1911

hurry up the original search. This might be repeated until no one was left in the office; but it was so much easier for Calder than trying to contact by telephone people who might be in any of a score of far-flung spots, from the cement kilns to the top of the 140-foot pressure tower.

At this time the works was unpaved. Dust or mud was ankle deep everywhere, thanks to the three-wheeled horse-drawn "dobbins," which had a fixed front wheel that skidded round corners. The best protection we possessed was quite inadequate goloshes.

One of our most trying jobs was the quarterly stocktaking. Whatever the weather, in storms of wind and rain, through snow, frost or fog, this began promptly at 6 a.m. on the Saturday morning. We clambered over huge mounds of spent oxide, the smell of which clung to us for days, of salt, soda crystals, saltcake, purple ore and muriate of ammonia. Mentally we shaped it and measured it with a tape. The stocks of liquid acids and alkalis had all to be "dipped" and "twaddelled"—in winter by the light of an electric lamp, while keeping a close eye on the foreman to see that he did not "improve" his stock by leaning the dip-rod or causing liquid to splash up it.

Taken all in all, it was an ordeal to test the nerve of the hardiest and included such hazards as walking out on to an unguarded eight-inch plank stretched across a large vitriol cistern in order to dip the centre; or stretching out over the edge of a boiling caustic pot with only a foot-high rail between the stocktaker and a very sticky end.

But the epic of the job was the Big Stock Tank, a 30-foot giant holding 2000 tons of vitriol and raised 30 feet in the air to give a gravity flow for the filling of rail tanks. The tank is still there, but how different the approach! Now, guarded stairs mount easily to the summit with graduated gauge glasses alongside by which the depth of acid may be read. But at that time the only means of access was a 60-foot vertical iron ladder; and up this the stocktakers had to climb, twisting round at the top to the inside of the ladder in order to climb through a lattice on to the tank itself. Arrived there, the pair set about dipping the 30-foot tank. One of them lowered a 12-foot length of ¾ inch steel tubing through an orifice in the top as far as he could, then gripped the end while his companion screwed into it a second length which in its turn was lowered until a third length could be attached and again lowered until the bottom was reached.

Then, with no more than a wad of cotton waste to protect his hands from the acid, the first man raised the 36 feet of tube until the other, also with a handful of waste, could unscrew the top length and lay it down on the steel roof of the tank. The second and third lengths followed, both men having to be careful that their arms did not rise above the horizontal or the acid would, of course, have run down, with unpleasant results. Finally, with a foot rule, the tubes were measured to the acid mark and the total was entered in a book.

Sampling the acid in the tank had always proved difficult. Brown oil of vitriol does not always run at exactly the same strength and is inclined to "layer" in a stock tank, so that a sample drawn from the run-off may "twaddell" from 140 to 144 degrees whereas the bulk of the contents may be two or three degrees more or less. There was once a works manager named Norris who declared he could overcome the difficulty by making use of the existing method of dipping. Watched with sadistic interest by the general manager, Mr. Calder, and the chief engineer, Mr. F. C. Vokes, he climbed to the top of the tank and, aided by Jack Kimberley, the vitriol foreman, lowered a series of tubes into the acid. He then plugged the end firmly with a cork, relying on natural forces to retain acid in the tubes until it could be released into his sampling vessel.

What he had not taken into account was the weight of 36 feet of steel tubing filled with acid, and some credit is due to him that he managed to withdraw the whole in one piece. Then, however, it took complete control; and the highly diverting spectacle ensued of poor Norris staggering about holding the tubing horizontally above his head with vitriol running down his arms and body while he uttered anguished howls of: "Hell and set fire to it! Hell and set fire to it!"

Road delivery of acid *in the tank as it was done in* 1911

It is said that the spectators below were splitting their sides, which was unkind, as the inventor and sole practitioner of this form of sampling spent the next fortnight in hospital. In these days of safety officers and precautions such an experiment would be impossible.

To return to the works office. "Uncle Bill" Calder was renowned for treating each of his staff in turn to what he called "roodling up." This process consisted of nagging and chivying the unfortunate individual, finding fault with his work, and keeping him continually on the jump. It lasted about a fortnight or until the victim could bear it no longer and went up in smoke. Then Calder patted him on the back, shook hands—and turned to the next in line. That was routine; but with the careless or unlucky who made several mistakes in succession he had a different technique, one which, in those days when the sack was a disgrace and might well cause hardship, was calculated to produce in the sufferer the maximum alarm and despondency.

Calder would wait until the Saturday morning and then call for some of his victim's work that he had reason to believe was either behind or likely to produce one or more errors, which with uncanny ability he would instantly spot. The subsequent homily always ended: "Well, I don't know what I shall do yet. I'll see you again on Monday," thereby assuring for the culprit a week-end of miserable uncertainty. On the Monday the close of the incident would always be: "I'm going to give you a last chance. If you don't pull your socks up . . ." Naturally, after a time the force of this was largely cushioned by the knowledge that Calder's really alarming bark was far worse than his bite; and many a time one of us returned from such a lecture to tell his comrades: "Another last chance!"

The works office was naturally closely involved with the works chemists, who at that time were never allowed to see the efficiency or cost figures for their own processes. They were therefore always pumping us for a little advance information. It was a queer policy, but in keeping with industry's general principle of not letting the left hand know what the right hand did. Similarly, straying off your own plant was strongly discouraged. Indeed, so secret was the Chance carbonate of ammonia process that anyone other than the management concerned found trespassing on that holy ground stood a very good chance of instant dismissal.

There was of course a lighter side to works life, and many a good joke was played—perhaps more so than today. But little or no recreation was organised. At Oldbury you were a rifleman or you were nothing. Occasional football was played; but no cricket, tennis, bowls or chess. The "club" was a single room containing one small bagatelle table and a tea urn. Very few girls were employed, so there were no dances. Moreover, at that time the cinema, radio and even motor transport were in their infancy, and lantern lectures were still the high-spot of social intercourse.

There were even men and women living in Oldbury who had never visited Birmingham, six miles away!

THAT OLD BALD CHEATER, TIME

—Ben Jonson

By P. R. Sandars (Overseas Personnel Officer)

Time plays some queer tricks on businessmen abroad these days. You can even arrive before you set off!

If you travel abroad much, which means travelling by air, you get used to peculiar schedules; leaving London Airport at 0001 hrs. followed by breakfast at Rome at 0350 hrs. was one of the joys of "Comet" travel when those wonderful but ill-fated planes were running to the Far East.

I confess, however, to having been momentarily shaken on seeing, in the timetable of a recent journey:

Wed., Feb. 13th—depart Tokyo 1900 *hrs.*
Wed., Feb. 13th—arrive Vancouver 2000 *hrs.*

This looked a bit quick, for Vancouver is 4740 miles across the Pacific from Tokyo; and not even Canadian Pacific Airlines, the service I was to use, can yet travel at 4740 miles per hour (thank goodness!). In fact, when 13th February came we had a nice tailwind and arrived 1½ hours ahead of schedule, thereby apparently reaching Vancouver half an hour before we left Tokyo.

. . . an imaginary line

The explanation of this oddity of travel lies in the International Date Line—an imaginary line which runs across the Pacific Ocean from Pole to Pole, roughly along longitude 180°—half-way round the world from the Greenwich meridian. The I.D.L. is a source of confusion to most people but is really quite simple to understand. If you set out to travel eastwards, you find that the sun rises earlier each day, and to keep things like opening time in their proper places you have to put your watch forward—by an hour for every 15 degrees of eastward travel. If you travel right round the world you will have traversed 360° and put your watch forward 24 hours.

Suppose, for example, that you set out at sunrise on Monday and travel 60° before the next sunrise, it will take you six days to go round the world and back to your starting point. (This can easily be done by normal air service—Jules Verne is way out of date.) Tuesday's sunrise will greet you after only 20 hours; by Wednesday dawn you will have been going for 40 hours; Thursday, Friday and Saturday will similarly pass in four hours less than the normal 24. And on Sunday at sunrise you will be home again; but at home it will only be Saturday's sun that is rising, because you have only been away for 120 hours, which make five days.

The same thing happens if you go by boat, or walk; but more slowly. This, unless something were done about it, would be a Bad Thing, and so, a good many years ago, they invented the I.D.L.

When you cross the I.D.L. from west to east you have to put your calendar back a whole day. So on my journey I had Wednesday, 13th February, twice running. If I had been going the other way, east to west, I should have had to turn my calendar on by two days, going straight from Wednesday to Friday.

. . . going straight

The I.D.L. does not run quite down "the other side of the world." If it did it would cross a number of islands, and it was not felt that it would be in the public interest to make it possible for the inhabitants, some of whom have developed the industry of doing nothing to a high pitch, to enjoy two Sundays each week and miss Mondays altogether just by going for a short weekly walk from west to east and then back again.

There used to be a song that ran "When it's night time in Italy it's Wednesday over here." Its title was "Three o'clock in the morning." The author had obviously crossed the I.D.L. by air.

PICTURES FROM OVERSEAS

South Africa. *The Umbogintwini factory of A.E. & C.I. celebrated its fiftieth anniversary in August. The factory was started in* 1908 *as an offshoot of the Kynoch Company. It is now the largest phosphate fertilizer factory in the southern hemisphere*

South Africa. *Mr. G. E. Hughes, the new Managing Director of A.E. & C.I. Ltd. Since the end of* 1953 *until his new appointment Mr. Hughes was Managing Director of I.C.I. (South Africa)*

Australia. *A smiling patient making a good recovery in the Alfred Hospital, Melbourne, after undergoing one of Australia's first open heart operations using 'Fluothane.'* (*See p.* 296)

Canada. *The largest conical blender ever constructed was recently installed at C.I.L.'s Edmonton Works. The Thoroblender will blend* 30 *tons of polythene cubes in one operation and achieve complete homogeneity in under an hour*

Australia. *Brown, they Nobel Fact replace the*

Our picture shows 16*-year-old Les oungest male employee at I.C.I.A.N.Z.'s ory, planting a pittosporum sapling to diseased veteran pepper tree which had stood on the site for* 90 *years*

Argentina. *Our photograph shows five members of the Oxford and Cambridge South American Expedition on arrival in Buenos Aires from Uruguay by ferry boat across the River Plate. They are all wearing 'Terylene'|cotton trousers, and part of the 'Terylene' towing rope can be seen on the luggage carrier*

NEWS IN PICTURES

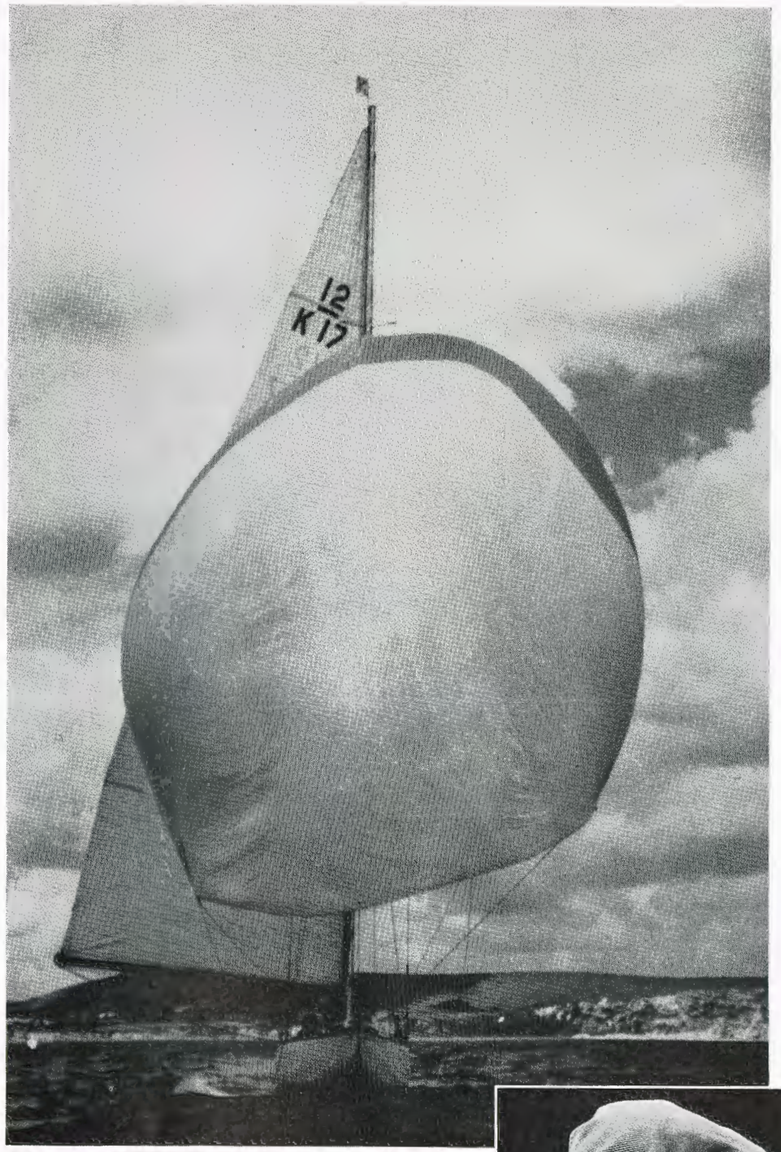
Bound for Buenos Aires. *This night scene on the River Weaver at Alkali Division's Wallerscote Works shows soda ash being loaded into one of the Division's river craft, "Madge," for subsequent transhipment at Liverpool to s.s. "Millais"*

Dyserth Camp. *150 children from the Northwich district attended the annual summer camp organised by Alkali Division. With the boys on the hilltop are F. Dickens (Construction Works) and J. W. Cross (Lostock Works)*

Work Study takes to the sea. *Earl Mountbatten, the First Sea Lord, officially opened the Royal Naval School of Work Study at Portsmouth on 4th July. With him on the dais are Maj. Gen. W. S. Cole, Air Vice-Marshal W. L. Freebody, Mr. R. M. Currie (Head of Central Work Study Dept.) and Admiral Sir Guy Grantham, C. in C. Portsmouth*

Miss I.C.I. South Wales. *Miss Jean Torrington (Metals Division) recently won this title at a dance organised by the I.C.I. South Wales Regional Sports and Recreation Club. She is attended here by Miss Barbara Evans and Mrs. Joan John*

Haymaking at Witton. *Our photographer recorded an unexpectedly rural scene at the Witton headquarters of Metals Division. The grass grew rapidly where old houses on part of the Witton site were pulled down last year*



The America's Cup. *"Sceptre," the British Royal Yacht Squadron's 12-metre yacht, is seen here during a practice race in Poole Bay, Dorset, before she sailed for America to take part in the America's Cup—held by the Americans for the past 21 years—which takes place later this month. All running rigging and all sails except the spinnaker are of 'Terylene.' Right: The ropes being reeved on to the 90 ft. high aluminium mast*

The Grange. *After 25 years Billingham Division's medical department is soon to move from this old farmhouse to accommodation in a new office block. Formerly the Grange was used as the main offices in the first years of Billingham Factory*

Tight Corner. *This steel column was manufactured by Head Wrightson for the Olefine Plant at Wilton. It is over 100 ft. long and 3 ft. in diameter and is one of the largest loads of its kind to be transported by road. Here it is negotiating a bend at Thornaby-on-Tees en route for Wilton*

Talyllyn Railway. *After rehabilitation, this 93-year-old saddle-tank locomotive now operates the seven miles of picturesque line running between Towyn and Abergynolwyn, Merioneth. Some of the material used for rebuilding was provided by Metals Division. Her copper firebox plates came from Landore Works in South Wales and her copper stay rods from the Rod Mill at Witton*

No crabs caught. *Three Billingham employees were in the Tees Rowing Club's junior crew which won at the club's own regatta at Yarm recently. They are Alan Parsons (left), Tony Frost (centre) and John Baker (second from right). Although they have only been rowing together since April they have already won three other cups*

Sister B. Todd (*Wilton Works*) *attended a Royal Garden Party at Buckingham Palace recently. She represented the Occupational Health Section of the Royal College of Nursing. She is secretary of the Occupational Health Group of Stockton-on-Tees*

Malcolm Evans, *18-year-old apprentice and first-aider at Alkali Division's Wallerscote Works, was commended for the way he dealt with a dangerous accident recently. His prompt action saved a severely injured woman from a long period of convalescence*

Mr. George Jones, *Castner-Kellner Works, General Chemicals Division, has completed 50 years' service with the Company. He joined Gaskell-Deacon Works in 1907 and transferred to Castner-Kellner in 1919*

Mr. John Harvie, *a greaser in Ardeer Nitrocellulose Department, reached his half-century of service with the Company on 11th July. His father, a yard foreman, was at Ardeer for over 30 years*

Runners-up. *Widnes Research Laboratory first aid team, captained by Mrs. E. Moorhouse (centre front), came second in the North West Civil Defence Tourney held at Manchester. Also in the picture is Mr. M. I. Davies, the team's instructor*

East meets West. *A Chinese paddy field scene for the film "The Inn of the Sixth Happiness," starring Ingrid Bergman and the late Robert Donat, was shot on land belonging to Cooke's Explosives Co. (a subsidiary of Nobel Division) at Penrhyndeudraeth*

Allez oop! *Everyone held their breath when the Alexis Troupe gave a daring display as part of the entertainment arranged at Alkali Division pensioners' garden party held at Winnington Hall, Northwich, recently*

Travelling Companion

By Hugh Dunt

Illustrated by Bruce Petty

We met at the carriage door of the train leaving Mombasa at 5 p.m. for Nairobi. With due deference to a man old enough to be my father, I said "After you, sir."

He accepted graciously. Following him, I found we were to share the same compartment for the overnight journey. In a matter of seconds he dealt with the African porter carrying his one battered suitcase. Giving me a smile, he departed to the corridor window to talk to some friends.

It took me considerably longer to sort out my brand new suitcases, each with its solitary label advertising my arrival on a liner which only a few hours ago had disgorged its human freight into what appeared to be a cold world. I use the word "cold" metaphorically. The temperature on the Mombasa docks that morning had been in the eighties, and someone had told me the humidity was 99%.

The only chill was in my own nervousness at meeting a new world. I longed for the security of shipboard friends, made since watching the White Cliffs sink into the dusk of an English evening three weeks ago. But they were all preoccupied with their own problems, and the great vessel which had been our home lay alongside the quay—no longer a palace of gaiety and excitement, but just a ship resting before starting a fresh job.

But all that was six hours behind; before I'd "negotiated" the customs; and before I'd paid twice the normal taxi fare into town—a luxury permitted to the inexperienced. However, my apprehensive generosity was amply repaid by the driver's gleaming smile and offers, I gathered, of further loyal service.

A hand-bell clanged on the platform and I moved to the window. We were about to depart. As on stations the world over, farewells took the familiar form of handshakes, kisses, some brave smiles and some not so brave. To me the scene only differed from my native Liverpool by the brown and black faces mingling with the white, the more colourful dress and the general impression that this was an Event. As indeed it was, there being only one passenger train out of Mombasa each day.

The wheels turned slowly, but the farewells were not over. Once clear of the station, cars followed us across the causeway which links Mombasa Island with the mainland of Africa. Their drivers were adept at waving with one hand and steering with the other, while a discord from numerous motor horns sped us on our way. My companion to be had returned to our compartment and settled himself by the far

window. His faded khaki shorts displayed weather-beaten knees; and a loose bush jacket completed the picture of a man who daily shoots elephant, rhino, and other such citizens of the jungle which I had seen in a zoo as a child and, more recently, on celluloid and cathode-ray tubes. A leathery hand pressed a button, and I heard a bell shrill in the corridor. At the same time the other hand reached for mine. "Ridsdale's my name," the owner said. "What's yours?"

As I introduced myself a steward appeared in the doorway, and again I heard Mr. Ridsdale saying "What's yours?"

I started to repeat myself, but realised this was a different question. "Oh . . . tea!" I stammered.

"Tea?" queried my new friend and then "Tea!"

I recognised my social blunder, but Mr. Ridsdale covered up his first astonishment. "Tea?" he repeated. "Excellent! Believe it's the best thirst-quencher in the world." Then, with an infectious chuckle, "That's why I never touch the stuff."

I laughed. "I'd rather have something with you, sir."

"Good!" exclaimed my host, and ordered whisky *mkubwa mbili*—which I soon found out were two large "seventeen under proof."

"First time out?" asked Mr. Ridsdale when we had sampled our glasses.

"Yes, sir," I admitted. In a few breathless sentences I told him of my firm's sudden decision to trust me away from their head office; or, more likely, see if a warmer climate could better produce from me any so far well-hidden talents. I went on to assure him of my previous sheltered existence and of my gratitude for the opportunity to lead a life which might even remotely resemble his. "You've been abroad a long time?" I ventured. I would have liked to ask more.

"Forty years." He savoured the last of his glass.

I hastily pressed the bell.

"Forty years," he went on. "It's a long time. Wonder if you'll see the changes I've seen. No luxury trains like this in my early days; Nairobi consisted of a few shacks and a dirt road. Now it's a mass of skyscrapers and double carriageways; but there were compensations. Chickens were a few cents each. We'd want a good fat one for the equivalent of sixpence, and a hundred eggs for a shilling. Our cost of living was four bob a bottle." He raised his replenished glass. "Never left any in an opened bottle then—might have gone sour! No, seriously, stuffed shirts at home might have thought we hit it pretty hard, but remember we'd no wonder drugs in those days. It was a straightforward battle between the mosquito and a man's constitution. Damn sure this helped."

Musical gongs sounded in the corridor, but Mr. Ridsdale had already invited me to join him at the last sitting for dinner. "Far the best," he'd said. "You're not rushed then." This was true, although I was also to realise that this arrangement afforded the longest drinking time, as few Kenyans drink after dinner, when their one ambition is to get into bed. A sensible rule, as I was to find out, for their day starts an hour earlier than in England. Mind you, that didn't mean a party need be dull—you just ate very late!

Mr. Ridsdale had helped me order the last drink. He'd advised "Just say *vile vile*. It means 'the same again'." Between us we *vile vile*'d three times before going in to dinner, and I began to feel sorry for any mosquito which might innocently attack my virgin flesh. The meal was excellent and made the more enjoyable by Mr. Ridsdale's tales of his recent deep-sea fishing holiday at the coast. If he exaggerated—as I understand most fishermen do—I was grateful for the added colour to his stories. He told me, too, of how he ran into debt during his first year in East Africa.

"Difficult for a young fellow," he said. "Credit in shops and clubs can be dangerous. Was for me. Mind you," and here his voice betrayed his regret at the passage of the years, "I was able to square matters—just went out and bagged a couple of elephant. Not so easy these days."

On this warning we returned to our compartment, to find beds made up on lower and upper bunks. I insisted youth should climb aloft. For the first hour I was too frightened of the six-foot drop to sleep. Memories of the last twelve hours vied with thoughts of the future. The occasional stop at a station and the inevitable chatter of native porters through the open window helped to keep me awake. It also prevented my forgetting Mr. Ridsdale's account of a lion taking a man from a railway carriage in 1919 or 1920. The year didn't matter. At this time of night I could not bring myself to believe that lions were any more civilised today than forty or, for that matter, a hundred years ago. Nor could I think of myself as being any less tasty to the king of beasts than a man of an earlier generation. That the cause of my anxiety slept peacefully below gave me no comfort. I should, of course, have dismissed any idea of a lion disturbing the slumber of such a man as Mr. Ridsdale as too absurd.

My name's Ridsdale . . . "What's yours?"

I don't know when the exertions and excitements of the day won the struggle. Vaguely I remember pulling a blanket over me as the train climbed up to the five thousand foot mark on its approach to the capital.

The sun was high enough to be warm when I looked at my watch. With our arrival timed for 8 a.m. I had only a few minutes over half an hour to wash, shave and breakfast. I shot over the side of my bunk. There was no sign of Mr. Ridsdale. A damp towel on his bed and the fresh scent of shaving soap told me his ablutions were completed. No doubt he was by now enjoying a leisurely plate of bacon and eggs in the dining car.

I had scraped one side of my face when the door opened. The mirror reflected a grey-haired gentleman in a dark suit. A tasteful bow tie against a white collar told me he was someone of consequence in the world of large desks and elegant secretaries. I expected him to apologise and withdraw. Instead he came in, sat down and said: "Good morning. Sleep well? You'd better get a move on if you want to eat on the train."

There was no mistaking the voice, and I pride myself on showing little of my surprise beyond a snick on my chin which took a week to heal.

I have not spoken to Mr. Ridsdale since we parted on Nairobi station a year ago. I have read about him in papers and glimpsed him sitting back in a large chauffeur-driven car. Once I passed him when leaving an expensive club to which I had been invited for lunch by a senior colleague. He nodded to me. I'm not sure that he recalled my face, but it impressed my companion. I had almost forgotten him until a couple of days ago, when I again travelled on the up train from Mombasa.

There was an echo of the past in this journey, which differed from the last only by the train leaving an hour later yet arriving in Nairobi at the same time as before, and the more battered appearance of my suitcase. Both factors, I felt, indicated the march of time.

The young man who shared a compartment with me soon confirmed that he had disembarked from the liner which had berthed earlier in the day. I pressed the bell for the steward, introduced myself, and asked: "First time out?"

"Running Repairs"

Photo by A. Walker (Cassel Works)